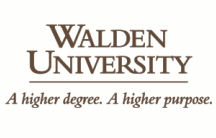

2018

Decreasing Operating Room Delays for Surgical Orthopedic Patients

Jacqueline P. Ogunjulugbe
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This is to certify that the doctoral study by

Jacqueline Ogunjulugbe

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Abstract

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by

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MSN/Ed, University of Phoenix, 2010

MSA, Central Michigan University, 1994

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AAS in Nursing, Borough of Manhattan Community College, 1979

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

November 2018

Abstract

The operating room (OR) at the project site was experiencing surgical delays for orthopedic surgical patients due to unavailable instruments, which led to a decrease in the efficiency of OR utilization. The purpose of this project was to decrease operating room delays for the orthopedic surgical patients. The practice-focused question explored whether a multidisciplinary approach to the procurement of instruments and supplies for the orthopedic surgical patient would help to ensure an on-time surgery start, resulting in increased efficiency in the utilization of the OR from 42% to 65% within a 9-month period. Lewin's change model was used to guide the project. Data analysis was conducted using a *t* test to compare the changes in the mean scores of the OR utilization rate before and after the involvement of a multidisciplinary team. An independent samples *t* test found no significant effect of the intervention, $t\ (13) = 0.74$, $p > .05$. Because the *t* test results were not significant at the $\alpha = .05$ level, results showed no evidence that the multidisciplinary team affected the OR utilization rate. Decreasing surgical delays can have the potential implication for positive social change at the organization level, because delays hinder optimal patient flow, increase anxiety for patient and families, and have a significant negative economic impact on hospitals.

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Dedication

I thank God for allowing me to achieve my dreams, I can do all things through Christ who strengthens me. This project is dedicated to my husband Babatunde Ogunjulugbe and my children Tesfa, Jamaly, Akil, and Jahi Allen. Thank you for your support and love through this journey.

Acknowledgments

I would like to acknowledge Dr. Mary Verklan, my instructor and mentor for her continuous support through this journey. To Lieutenant Colonel Sheila Webb, my preceptor for her support and confidence in my ability. To Colonel Laura Trinkle, the hospital Commander for allowing me access into the Organization. To Colonel Tonya Dickerson, Chief Nursing Officer for entrusting me with the project, to my friend Ph.D. (candidate) Doretha Singley for her persistent encouragement for me to pursue a doctoral degree. To my Pastor, Bishop Aston Miller, for his continuous prayer and confidence that I could do this.

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Section 1: Nature of the Project

Introduction

Enhancing the efficiency of the operating room (OR) is a challenging process for hospitals (Wright, Roche, & Khoury, 2010). According to Wright, Roche, and Khoury (2010) maximizing utilization is a major efficiency effort in most ORs. Many factors affect utilization, such as booked surgeries that start on time and end on time. According to Knudson (2013) approximately 60–70% of hospital proceeds are utilized in the OR. The OR is the greatest source of profitability and the costliest for the hospital. Effective scheduling that maximizes the use of personnel, equipment, and rooms are essential to maintaining OR efficiency.

Efficiency in the OR is the maximized value that occurs when inefficiency is minimized (O'Sullivan & Dexter, 2006). Inefficiency of OR time is represented by the sum of hours of underutilized time multiplied by the cost per hour of underutilized hours and the hours of overutilized time multiplied by the cost per hour of overutilized hours (O'Sullivan & Dexter, 2006). Underutilization of OR time refers to the positive difference between the total hours of surgeries performed and the time allocated for a given OR; if an OR allocated time is from 7 AM to 3 PM and finishes at 1 PM, 2 hours of underutilized time are generated (O'Sullivan & Dexter, 2006). Overutilization of OR time is the positive difference between total hours of surgeries performed and the time allocated to a given OR; if an OR allocated time is from 7 AM to 3 PM and the cases are finished at 5 PM, there are 2 hours of overutilized time (O'Sullivan & Dexter, 2006).

The OR at an ambulatory care center (ACC) is the focus of this project. The site was experiencing a decrease in efficiency in utilization, due to issues in the procurement of surgical instruments. The issues were, in part, related to a lack of communication between the logistics department and the OR, which caused delays in orthopedic surgery. In three sections, this paper will discuss the issue of decreased efficiency in OR utilization, and the methods that were developed through evidence-based intervention to improve OR efficiency. Section 1 discusses the background, problem, purpose, project focused question and objectives, nature of the project, definitions, assumptions, scope and delimitations, limitations, and significance.

Background

The OR at the ACC is a three-room suite that supports elective outpatient surgeries, approximately 200 surgeries are performed each month. The mission at the ACC is to serve active-duty service members, retirees, and their families. Patients are scheduled for surgery through their referring surgeons. The referring surgeons are assigned to the ACC and other military facilities in the surrounding areas (ACC, 2014). The OR was experiencing (a) delays in the procurement of instruments, (b) communication conflict between the logistics supervisor and the perioperative supervisor, and (c) delays in orthopedic surgeries. These three issues resulted in decreased efficiency in OR utilization.

Problem Statement

At the ACC, the practice issue was the delay in orthopedic surgeries due to unavailable instruments; this led to a decrease in efficiency in OR utilization. According to Wong, Khu, Kaderali, and Bernstein (2010) delays in surgery occur on the day of the scheduled operation and can be attributed to human errors and system deficiencies. Delays in the OR is a source of frustration for the surgeon and perioperative staff Wong, Khu, Kaderali, & Bernstein (2010).

A designated OR staff at the ACC was responsible for ordering surgical supplies from vendors who had purchasing contracts with the organization; the logistics department was responsible for maintaining the contracts. However, some expiring contracts were not renewed due a turnover among the logistics staff. Some of these expired contracts were with vendors whose products surgeons preferred using. Supplies could be ordered from vendors whose contract had expired by using a government credit card, but the limit for each purchase using the government credit card is $3000.00. If the purchase exceed $3000.00 prior approval must be obtained from the logistic department before the transaction is conducted. The logistic department has the sole authority to approve purchase orders that exceed $3000.00.

To accommodate the surgeon's preference and prevent a delay in surgery, the OR staff used the government credit card to order the supplies from the surgeon's vendor of choice. At times the cost exceed $3000.00, but to expedite the process, the staff made the purchase anyway even though that person do not have that authority to do so. The staff

member would then notified the logistics department of the purchase that exceeded $3000.00. When this occurred, the chief of logistic (CL) requested that the OR staff member who had made the purchase sign an unauthorized commitment statement which held that staff member responsible for the additional cost that exceeded $3000.00. Given the controversy over unauthorized commitment, the responsibility for ordering supplies was taken from the OR and given to the logistics department to prevent further occurrences of unauthorized commitment.

The request for supplies was submitted to the logistics department 2 weeks prior to the scheduled surgery date, with a requested delivery date of one day prior to the day of surgery. The requested arrival date was critical to allow for a rigorous sterilization process, which included a biological spore testing protocol if the items were to be implanted into the patient. There were strict guidelines for the biological spore testing to verify the sterility of the instrument. Lacking a comprehensive knowledge of OR processes, the logistics department had not been able to procure supplies for the requested date to meet the OR requirements. Complicating the issues was the lack of open communication between the logistics supervisor and the perioperative supervisor which resulted in delays in the procurement of supplies.

I met separately with both the CL and the chief of the perioperative department (CPD) to understand the communication conflict that had been occurring. The CL explained to me that the OR staff were falsifying the request for supplies by requesting that the supplies arrive a day in advance of the surgery date. Since I was an OR nurse I

explained the process to the CL, explaining that the products do need to arrive a day in advance in order to go through the sterilization process. The CL thought that the instruments were already sterile when they arrived, and that it was okay for the instruments to arrive on the day of surgery.

A second issue was that, while the first cases are scheduled to begin at 0730, the logistics department often scheduled the arrival of the instruments on the day of surgery at 1000, which caused a delay in the surgical procedure (Personal communication, Webb, 2015). The surgeons were frustrated since they had travelled from other military facilities that were over an hour away only to experience the delay. To avoid delays, the OR nurses on occasion used the government credit card to purchase the necessary items bypassing the logistics department. I next met with the CPD, who complained about the late arrival of the instruments, and blamed the CL.

I explained to the CPD the logistics department's lack of understanding of the OR processes. I asked the CPD why she did not explain the OR process to the logistics department. The CPD stated that the logistics department should have asked for clarification if it did not understand the process. I informed the CPD that both her actions and the actions of the CL has caused delays and frustration for the patients and the staff. The CPD acknowledged the role she played in causing the delays and later enrolled in a communication class to improve her communication skills.

Purpose

The purpose of this DNP project was to decrease the occurrences of delays for orthopedic surgical patients by having all surgical instruments arrive on time to so that the first cases could start at 0730, which, in turn, would improve efficiency in OR utilization. According to Wright, Roche, and Khoury (2010) major efficiency efforts in the OR are focused on maximizing utilization. Factors affecting utilization rates include an appropriately booked schedule that starts on time and ends on time. Managing the OR efficiently is essential when hospitals and healthcare systems aim to maximize health outcome with limited resources (Peltokorpi, 2011). According to Rosswurn and Larrabee (1999) in the new healthcare environment practitioners cannot rely on clinical experience, pathophysiological rationale, and opinion-based practice. Practitioners must question their current practices and find better alternatives.

Practice-Focused Question and Objectives

The practice-focused question was as follows: Would a multidisciplinary approach to the procurement of instruments and supplies for the orthopedic surgical patient ensure an on-time surgery start at 0730, resulting in increased efficiency in the utilization of the OR from 42–65% within a 9-month period? Two objectives were identified to address the question. The first objective was to improve OR utilization by having the required surgical instruments available to facilitate a 0730 on-time start 90%

of the time. Policies and procedures were established that outlined the timeline appropriate for the procuring of required surgical instruments (Appendix C). ORs are constantly undergoing change, including the adoption of new policies and procedures, technologies, products, equipment, and evidence-based practice recommendations (White, 2014). According to White (2014) policies and procedures being modified frequently cause stress and frustration among staff members. Providing information ahead of time when initiating a potential change is important to prevent resistance.

The second objective was to increase the utilization rate from 42–65%. Increasing the utilization rate of the OR could be accomplished by the CL and the CPD working collaboratively as part of a multidisciplinary team to implement a change in procedure. According to Bowers (2012) implementing research findings into practice can take many years, due to poor adoption and because of insufficient knowledge and skills, lack of adoption by leaders, and lack of desire to change. To support the work of the organization the two department leaders must resolve their differences and prevent further delays in the procurement process. To be fully effective, the two leaders must be proficient in the technical work skills, understand, and intentionally choose the work processes that will most likely achieve the desired outcomes, and can form and sustain a positive work relationship (Porter-O'Grady, & Malloch, 2012).

Nature of the Doctoral Project

The American Association of Colleges of Nursing (AACN) proposed the Doctor of Nursing Practice (DNP) course of study conclude with a scholarly project. The project should be consistent with the DNP student scholarly domain, address a practice problem, propose an evidence-based intervention, use doctoral-level leadership skills to implement, and evaluate the effectiveness of the intervention, and outcome (Zaccagnini & White, 2012). The student's practice area, the OR, was experiencing delays in the procurement of supplies and instruments, and communication conflicts that decrease efficiency in OR utilization.

Successful factors for addressing the delays and communication issues included (a) the renewal of the purchasing contract, (b) education of the logistics department on OR process, and (c) provision of resources for the two supervisors to overcome their communication barrier. The social cognitive theory from the behavioral theories of change was used to provide a framework for overcoming the communication barrier. The social cognitive theory developed by Albert Bandura helped to explain and predict individual and group behavior, and to identify methods in which behavior can be modified or changed. The social cognitive theory proposes that while behavior change is affected by personal factors, individuals must believe in their capability to change and possess the self-efficacy to change (White & Dudley-Brown, 2012).

Definition of Terms

For this evidence-based project, the following key terms were used:

OR start time: The time the patient enters the OR (Ranganathan, Khanapurkar & Divatia, 2013).

Procurement: The acquisition of goods and services by government and their agencies (Warrillow, 1995).

Orthopedic surgery: The medical specialty that investigates, and restores the form and function of the extremities, spine, and musculoskeletal structures (McCarthy, 2015).

OR utilization rate: The percentage of total OR time that was used, based on the number of ORs and the operating time (Ranganathan, Khanapurkar, & Divatia, 2013).

Surgical instruments: Tools used by the surgical team to successfully complete a surgery (McCarthy, 2015).

Assumptions

There are several assumptions that were made, first the chief of logistics and the chief of perioperative department would work professionally to ensure that the orthopedic patients are being cared for in a safe, efficient manner. Second, the logistics department would purchase the supplies for the requested time to meet the OR requirements. Third, the logistics staff would pursue renewing the purchasing contracts. Lastly, a reduction of cancellations and delays would alleviate stressors for the patient and their families.

Scope and Delimitations

At the ACC, the scope of the project was to have surgical instruments and supplies available to facilitate a 0730 on-time start 90% of the time, and to increase the utilization rate from 42–65%within a 9-month period. Increasing the utilization rate of the OR can be accomplished by the collaborative effort of the CL and the CPD working to implement a change in procedure. The logistics staff ensured the renewal of expired purchasing contracts. Policies and procedures were established that outlined the timeline appropriate for the procuring of the required surgical instruments.

The delimitation was that the project was restricted to the OR at the ACC.

Limitations

The limitation that was identified is that there is no historical data on cancelled or delayed orthopedic surgeries to establish a benchmark. The organization used paper charting and the delays were annotated in the patient's charts. There was no way to identify which patient was delayed. Data collection is critical in achieving national quality goals (Buntin, Jain, & Blumenthal, 2010).

Significance

Evidence-based practice (EBP) is considered the basis for nursing practice. It is necessary to understand the experience of implementing EBPs in nursing and to determine best strategies for change (Irwin, Bergman, & Richards, 2013). White and Dudley-Brown (2012) stated that the management of patient outcomes and applying

evidence to practice are tools that can be used to improve quality of care and patient outcomes. Research findings support the effect of research-based nursing on patient care outcomes

Equipment or supplies not being available can derail the OR schedule for the entire day (Knudson, 2013). Cancellations interrupt patient flow, decrease throughput, waste resources, and may cause psychological trauma to patients (Talati et al., 2015). According to Yoon et al. (2009) delayed or cancelled surgeries could disrupt patients' lives, cost lost work days, and could lead to patient dissatisfaction. Delays in procedures have also been associated with depression in patients because of the high level of emotions associated with surgery.

According to Panni et al. (2013). Improving OR efficiency involves many factors. OR costs are high ($10–$30 per minute), and each minute that an OR is not used has a significant negative impact on overall hospital costs and the perioperative budget. To maximize utilization of the OR requires that every case start on time each morning Valuable resources are wasted whenever the OR is idle (Sandberg et al., 2005). Resolving the issue of the instruments arriving on the day of surgery would yield adequate time for the sterilization process, thus minimizing delays and cancellations. A reduction in surgical delays, which leads to an increase in OR utilization, could also lead to patient satisfaction.

Gaps in Practice

The overall goal of the practice change was to increase efficiency in OR utilization by ensuring the timely availability of instruments and supplies. The lack of efficient OR utilization impaired the ability to care for orthopedic surgical patients efficiently. Efficient use of OR time is important for maximum utilization, which is accomplished when each surgery starts on time every day (Panni et al., 2013). Delays in the orthopedic surgeries starting on time constituted a gap in practice at the ACC. According to Plasters, Seagull, and Xiao (2003), management of OR efficiency requires the coordination of material and human resources in a manner that supports surgery being performed efficiently and safely.

Wong et al. (2009) conducted a study on delays in the OR from May 2000 to February 2001. A total of 1,531 elective surgeries were performed during that time. The prevalence, cause, and impact of errors on the perioperative systems were analyzed. The most common type of errors was delays at 33.6%, and at least one delay occurred in over 51% of all cases. More delays occurred in the first cases of the day than in subsequent cases. Wong et al. (2009) concluded that perioperative delays occur frequently, and have a major impact on patient flow and resource utilization. Thorough documentation of delays in the OR provides a basis on which to develop solutions for improving OR efficiency.

At the ACC, efficient use of the OR was also impaired by poor communication between the CL and the CPD, which has since been resolved. Good communication

between health care professionals is essential for proper patient care (Baker, Sullivan & Emery, 2006). Braaf et al. (2012) investigated professional communication to understand providers' perceptions of organizational communication in the perioperative area, and to identify areas for improvement. The findings showed that there was dissatisfaction with communication from top management, and providers perceived that information was inadequately communicated. Nurses were less satisfied than surgeons with the timeline of information, and anesthetists were less satisfied than nurses with the timeline of information (Braaf et al., 2012).

Implications for Social Change

This study has implications for social change. The CL and the CPD need to become more knowledgeable of the role each plays in achieving optimal patient outcomes; they need to maintain open communication through initiatives that will play a central role in establishing interprofessional collaboration—including the implementation of sustainable practice changes to minimize surgical delays. Decreasing surgical delays have implications for positive social change, since delays hinder optimal patient flow, can increase anxiety for both patients and families, is a source of frustration for the surgeon and the perioperative staff, and can have a significant negative economic impact on hospitals. The American Association of Colleges of Nursing (AACN), DNP Essential VI, focuses on interprofessional collaboration for improving patient and population health outcomes. The aim of this DNP project was to decrease delays in surgery among

orthopedic surgical patients, and to help the two chiefs, CL and CPD, maintain open communication (AACN, 2006).

Communication is an important aspect of collaborative practice. To maintain communication between the leaders of logistics and the perioperative sections, a proposed change was that each section be oriented to the other section and to become more knowledgeable of each area's process. Since the CL was unaware of OR processes, a day in the OR observing the preoperative, intraoperative, and postoperative phases would give insight into the process that needs to be undertaken to prevent delays. Educating interprofessional teams can alleviate the communication gap as knowledge increases. Coeling and Cukr (2000) stated that to identify communication behavior related to collaboration Norton's theory of communication style can be used to identify specific communication behaviors. Style is defined as the way in which one communicates. Included in style is how someone interacts to create expectations for future behavior for both participants. Behaviors are constantly shaped by the moment-to-moment style that is use as participants talk.

According to Coeling and Cukr (2000) collaboration is essential in providing quality care. Two of Norton's nine communicator styles were identified in the perioperative setting at the ACC: dominant and contentious. The dominant style refers to speaking frequently, strongly, in a dominant, take-charge manner. Contentious refers to an argumentative, challenging manner; participants have a hard time stopping the conversation. Changing communication styles to another style, which Norton describes as

attentive, can improve patient, surgeon, and nurse satisfaction. The attentive communicator style communicates in a careful empathetic way, showing that one is listening, and can repeat what was said

Summary

At the ACC, the practice issue was the delay of orthopedic surgeries due to unavailable instruments, which led to a decrease in efficiency in OR utilization. The purpose of this DNP project was to reduce the number of delays for the orthopedic surgical patients by having surgical instruments arrive on time so that the first cases could begin at 0730. This, in turn, would improve efficiency in OR utilization. Maximizing utilization is a major efficiency effort in most ORs, there are many factors that affect utilization such as booked surgery that starts on time and ends on time (Wright, Roche, & Khoury, 2010). Late start cases can derail an entire OR schedule, and may be caused by a variety of factors that include delayed room setup, and equipment or supplies not being available (Knudson, 2013).

A gap in practice at the ACC is not having the requested supplies available for surgery. Assumptions were made that the logistics department would purchase the supplies for the requested time to meet the OR demand, and the logistics staff would renew the purchasing contracts. Another assumption was that the CL and the CPD would continue to have a better relationship to ensure that the orthopedic patients were being cared for in a safe, efficient manner. There was a lack of historical data on cancelled or delayed surgeries to establish a benchmark.

This paper continues to explore the practice issue by discussing the background and context in Section 2.

Section 2: Background and Context

Introduction

The practice problem being investigated for this DNP project was delayed orthopedic surgeries due to unavailable instruments which, in turn, led to a decrease in efficiency in OR utilization. OR utilization is closely tied to OR efficiency, and an efficiently run OR requires that each surgical case start on time and end on time (Wright, Roche, & Khoury, 2010). The purpose of this DNP project was to decrease the delays for orthopedic surgical patients by having surgical instruments arrive on time to facilitate the first cases beginning at 0730, which, in turn, would improve efficiency in OR utilization. Wright, Roche, and Khoury (2010) noted that major efficiency efforts in the OR are focused on maximizing utilization. Factors affecting utilization rates include an appropriately booked surgical schedule that starts on time and ends on time. According to Peltokorpi (2011) managing the OR efficiently is essential when hospitals and healthcare systems aim to maximize health outcomes with limited resources.

Section 2 discusses the concepts, models, and theories, relevance of nursing practice, local background and context, and the role of the DNP student.

Literature Search Strategy

A literature review was conducted using the following databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, EBSCOhost, Google Scholar, Cochrane Database of Systemic Review, and ProQuest Nursing and Allied Health Sources. Key terms and phrases for the search were as follows: *OR utilization, OR*

efficiency, delays in the OR, cancellation of elective surgery, communication, interdisciplinary team work, collaboration and *implementing change*. Thirty articles were identified that met the broadly identified subject of efficiency in the OR. Eleven were rejected as they were editorials and not peer reviewed.

Concepts, Models, and Theories

In assessing a need for a change in practice at the ACC, a link was established between the reasons for delay and logistical demands. A proposed change design was created to help the logistics department in acquiring supplies in a timely manner, and to improve communication between the two departments. The process for change was guided by Lewin's change management model (McGarry, Cashin & Fowler, 2012).

This three-step model of change—unfreeze, move, and refreeze—were used in planning for change at the ACC (see Figure 1). In Lewin's change model, the people involved must participate in all aspects of the change. The unfreeze step was used to get all stakeholders to understand the need for the change by communicating the rationale for the proposed change in weekly multidisciplinary meetings. The move step was used to create a detailed plan of action to implement the new steps in the procurement process so that supplies would be available for surgeries. The refreeze step was used to stabilize the change, new policies were written with the collaboration of the multidisciplinary team, meetings were held, and educational boards were established to facilitate and maintain the new changes in practice (White, 2014).

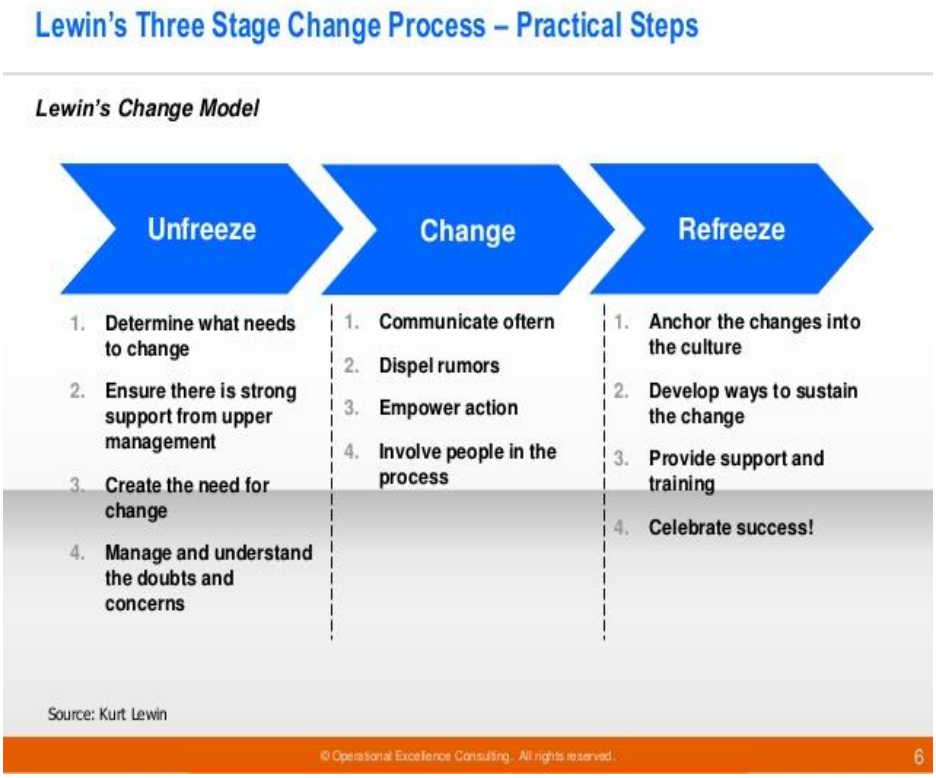

Figure 1. Lewin's three-stage change process—practical steps.

The social cognitive theory from the behavioral theories of change was used to facilitate change in communication. According to White and Dudley-Brown (2012) the purpose of the theory is to understand and predict individual and group behavior, and identify methods in which behavior can be modified or change. The social cognitive change theory proposes that behavior change is affected by personal factors, individual must believe in their capability to change and possess the self-efficacy to change.

Literature Review Related to Methods

According to Lange-Kuite and Meadows (2002) forty-two percent of patient revenue in an organization is generated from the OR. The OR deserves resource management consideration since it generates a great share of expenses and resource demands. Mission critical function in the OR include scheduling, documentation, and supply management. Knudson (2013) noted that OR efficiency can be hindered by cancelled surgery, limited supply, scheduling errors, and equipment availability.

Efficiency and Utilization

Lange-Kuitse & Meadows (2002) stated that ORs contribute to both workload and revenue of a hospital. The efficient use of OR time depends on equipment, scheduling of cases, allocation of staff, and performance of surgery. Efficient use of supplies, equipment, personnel, and facilities can allow the organization to schedule an additional surgery each day which can result in $1.8 million additional revenue annually. Vassell (2016) reported that the American Association of Critical Care Nurses recognizes that the work environment affects nursing performance and patient outcome. Therefore, creating a healthy environment in the OR can lead to greater efficiency.

Panni et al. (2013) aimed to identify reasons that led to delay and implement strategies to address the identified issues. The methodology was to act on the information that was obtained from a benchmark of the organization practice. A checklist was implemented listing specific items that was needed prior to the patient being taken back to the OR, a facilitator was employed to intervene whenever there were missing items,

and data was presented over an 18-month period. In February 2010, there was an average of 10.7 delay in first start case, by August 2010 delays was decrease to 4.95 which is a 49.2% reduction. Panni et al., (2013) reported that the pre-operative checklist and a facilitator resulted in marked improvement in first case starting on time. For the DNP project discovering that items were missing prior to the patient being taken to the OR had been a contributing factor for the decrease in efficiency in OR utilization. The use of a checklist and facilitator at the ACC would be more efficient if used days before the day of surgery.

Because utilization adds to efficiency, OR utilization is described as the amount of time it takes for each surgical procedure to be performed, the total turnover time divided by available time (Tyler, Pasquariello & Chen, 2003). Utilization rates depend on booked cases that start and ends on time (Wright, Roche & Khoury, 2010). Wright, Roche, and Khoury (2010) evaluated an initiative to improve cases starting on time in the OR. Kotter's eight steps to transforming organization was used for the process of change using a multidisciplinary team approach. Utilization increased from 6% to 60% over a 9-month period. Wright, Roche and Khoury (2010) concluded that a multidisciplinary approach can increase the number of surgeries that start on time. The study conducted by Wright, Roche and Khoury (2010) supports the project practice-focused question: Would a multidisciplinary approach to the procurement of instruments and supplies for the orthopedic surgical patient ensure an on-time surgery start at 0730 resulting in increased efficiency in the utilization of the OR from 42–65%within a 9-month period?

Delay and Cancellations

Delays in the OR are key factors that hinders optimal patient flow and have a significant impact economically on the hospital (Peter et al., 2011). Wong et al. (2009) aimed to identify, classify, and analyze perioperative delays using a prospective database over a 9-year period. All subjects having an elective surgery between May 2000 and February 2009 were entered in an observational study by one neurosurgeon, all errors were identified and recorded. The type of errors was classified as technical, contamination, delays, and equipment. Only data on delays were considered, and delays were categorized as long wait because of system inefficiency. During the study period a total of 1531 elective cases were performed. The most common type of errors reported were delays at 33.6%, there was at least one delay in 51.4% of all cases. Wong et al (2009) reported that a limitation for this study is one neurosurgeon collected data which was based on the neurosurgeon's personal criteria. Having only one person observing can cause bias on how delays are identified. In this study, perioperative system delays are a common type of error in neurosurgery, the lessons learned in this study are applicable in other surgical disciplines (Wong et al., 2009). System inefficiency supports the DNP project since the organization was faced with expired purchasing contracts.

Cancellation of scheduled surgical cases results in the inefficient use of OR time and waste of resources. Cancellation rates differ from one hospital to another with rates varying from 10% to 40% (Mesmar et al., 2011). Surgical cancellation may be due to patient, administrative or medical issues, is inconvenient, and stressful to the patient since

the patient experience loss of working days and disruption of daily life (Mesmar et al., 2011). In a study done in Nigeria, Ezike, Ajuzieogu, and Amucheazi (2011) determined that there were 226 causes of cancellation of surgery on the day of surgery from data that were collected retrospectively over a 32-month period. The causes were broken down into patient related reasons, medical causes, administrative/logistics causes, and physician related causes.

Administrative/logistics causes constituted 7.1% of cancellations and were attributed to lack of availability of linen and sterile instruments (Ezike, Ajuzieogu & Amucheazi, 2011). Limitations of the study included that the number of cancelled cases and patient demographic were not always documented, making it difficult for the rate of cancelled cases to be calculated (Ezike, Ajuzieogu & Amucheazi, 2011). It was concluded that preventable cause of surgery cancellation was the most prominent (Ezike, Ajuzieogu & Amucheazi, 2011). A similar situation was experienced at the DNP student project site, where the cancelled cases were not documented, and cancellations were preventable.

Collaboration and Communication

Collaboration is an essential factor in providing quality patient care. However, the literature has shown that many health care professionals do not fully collaborate with each other (Coeling & Cukr, 2000). A factor that contributes to the health care professional not collaborating with each other is the lack of using communication styles. Norton's theory of communication style can be used to identify communication behavior

associated with collaboration. In Norton's communication style, style is defined as the way one communicates and how someone interacts to create future behavior for the participants (Coeling & Cukr, 2000). Lack of collaboration was a main factor at the project site, and was further complicated by the supervisors' communication style.

Braaf et al. (2012) aimed to understand providers' perceptions of organizational communication and identify areas that need improvement in the perioperative area. Mania's communication model was use since it is specific to healthcare and communication research, and a cross-sectional survey design was used (Braaf et al., 2012). According to Braaf et al. (2012) a total of 281 providers completed the survey, the result showed that providers were not satisfied with communication from top management, and perceived the communication of information to be inadequate. It was concluded that communication was insufficient for transmitting information, and there was a need for improved communication among workers across the perioperative arena. Braaf et al. (2012) reported that effective communication among perioperative professionals is critical in delivering safe patient care. The study supports the DNP project where there was a need for improved communication among the staff.

Relevance to Nursing Practice

The DNP graduate must understand principles of practice management, including conceptual and practical strategies for balancing productivity with quality of care. A DNP graduate will be able to assess the impact of practice policies and procedures on meeting the health needs of the patient population. The DNP prepared nurse must be proficient in

quality improvement strategies and in creating and sustaining changes at the organizational and policy levels (Zaccagnini & White, 2012). DNP Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking is critical for DNP graduates to improve patient, and healthcare outcomes. Doctoral level knowledge and skills in these areas are consistent with nursing and health care goals to eliminate health disparities and to promote patient safety and excellence in practice (AACN, 2006).

Local Background and Context

The ACC is a three-room OR suite that supports elective outpatient surgery for ear, nose and throat surgery, general surgery, urology, hand, ophthalmology, orthopedic, plastic, and podiatry. Two hundred surgeries are performed monthly utilizing the three rooms daily. The OR personnel had the responsibility of ordering surgical supplies through purchasing contracts with several vendors. The logistics department was responsible for maintaining the contracts and had allowed some contracts to expire. With not having a full complement of contracts the logistics department was given the responsibility of ordering supplies. Supplies were ordered from vendors whose contracts had not expired. However, some of the vendors' products were not the surgeon's choice. The logistics department had not been able to meet the OR demand for supplies; thus, the supplies arrived on the morning of surgery causing a delay in surgery (Personal communication, Webb, 2015).

Role of the DNP Student

The DNP student can facilitate change or serve as a change agent which is a function required for successful collaboration. The DNP student must be versed in one or more theories of change to effectively motivate or move the collaborative team to the optimal goal (Zaccagnini & White, 2012). Areas that the DNP student focused on were inter-professional collaboration between logistic, the surgeons, anesthesia providers, the OR staff, sterile processing department, and the vendors. Inter-professional collaboration is crucial for success of a program, inter-professional collaboration describes the interaction among individual professionals who may represent different disciplines, but bring their unique educational backgrounds, experiences, values, and identities to the process (Zaccagnini & White, 2012). DNP Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes, states that the DNP nurse have the preparation in methods of effective team leadership and are prepared to play a central role in establishing inter-professional teams, participating in the work of the team, and assuming leadership of teams when appropriate (AACN, 2006).

Summary

An efficiently run OR requires that each surgical case starts on time and ends on time. Efficient use of supplies, equipment, personnel, and facilities can allow the organization to schedule an additional surgery each day which can result in $1.8 million additional revenue annually. A major efficient effort in most OR is maximizing

utilization. Utilization rates depends on booked cases that starts on time and ends on time. Forty-two percent of organization patient revenue is generated from the OR. Economically delays or cancellation of surgery can increase hospital's cost and affect efficiency in the OR. Areas that the DNP student focused on were inter-professional collaboration between logistic, the surgeons, anesthesia providers, the OR staff, sterile processing department, and the vendors. Inter-professional collaboration is crucial for success of a program, inter-professional collaboration describes the interaction among individual professionals who may represent different disciplines, but bring their unique educational backgrounds, experiences, values, and identities to the process (Zaccagnini & White, 2012).

This paper continues to explore the practice problem by discussing the collection and analysis of evidence in Section 3.

Section 3: Collection and Analysis of Evidence

Introduction

The purpose of this DNP project was to decrease the occurrences of delays for the orthopedic surgical patients by having surgical instruments arrive on time to facilitate the first cases beginning at 0730, which, in turn, would improve efficiency in OR utilization.

According to Kettner, Maroney and Martin (2013) there are many important components to be considered with planning and implementing processes to improve the OR utilization rate, such as the development of a project design methodology, population sampling, and data collection methods. The available literature suggested that efficient use of OR time is important for creating an efficient and cost-effective operation. OR utilization is often used as an index to evaluate the surgeon's performance and is also an indicator of the organization's performance. Kettner et al. (2013) stated that improving OR utilization is an essential aspect of maintaining the organization's financial viability. Planning a program for the perioperative area that is designed to achieve increased efficiency, resulting in optimum care of the surgical patient, is a very complex process.

Section 3 discusses the approach and rationale, data collection, data analysis, and an evaluation plan as part of the evidence-based practice initiative to improve OR utilization at the ACC.

Approach and Rationale

Project Design and Methods

The project initiative used a before and after quantitative design, to determine if the implementation of a multidisciplinary approach would increase OR utilization efficiency. The goals were twofold: that (a) all required surgical instruments would be available prior to the start of a procedure (b) there was an increase in the OR utilization rate from 42% to 65%. As previously noted, increased utilization rate signals increased OR efficiency.

The data collected over a 6-month timeline included the OR utilization rate, which was based on the number of ORs being used and the minutes used in a 24-hour period, during weekdays, Monday to Friday. Surgeries performed on weekends and public holidays were excluded since the utilization rate is based on weekdays. The investigated variables included the total hours that were available and the total hours that were used for surgeries each month. The total hours that were available differed each month depending on military base closures due to Federal holidays.

Population and Sampling

The population of the project consisted of the entire OR staff, orthopedic surgeons, logisticians, sterile processing technicians, and anesthesia providers. There was no sampling due to the involvement of the entire OR staff. The retrospective and prospective

data were obtained from the surgical service's electronic surgical scheduling system database.

Ethical Protection of Participants/Human Subjects

The project did not begin until approval was received from Walden University Institutional Review Board (Approval No. 11-30-17-0495225). Data collected did not have any patient identifiers, only statistical numbers so anonymity would be protected. Because the project initiative was a retrospective review of data found in the electronic surgical system, there was no actual patient involvement. All data that were collected were stored on my private computer, protected by a password, firewall, antivirus software, and located in a locked private office.

Data Collection

The data was collected by the preceptor and given to the student in de-identified format and only contained statistical numbers. Retrospective and prospective data that were collected from the electronic Surgical Scheduling System (S3) were the total hours available for use for all surgical services, the hours used, and utilization rate for the OR from January 1, 2015 to June 30, 2015. The preceptor logged onto the computer and clicked on S3, then clicked on "reports." Once in the reports window appeared, she clicked on room utilization, then entered the date range of January 1, 2015 to June 30, 2015, and chose "select." A new window opened with several options to check. She checked the box for breakdown by service, and the box for calculate using patient in and out of the room time. She then clicked on enter and the room utilization report appeared.

The room utilization report consisted of several components including used hours which is the time between the patients entering the OR and the time the patient leaves the OR for each case, the utilization rate for each surgical service, and the total utilization rate of the OR. All cases performed during the day shift between 0730 to 1530 hours were included in the report since only the day shift hours were used in the calculation of OR utilization.

Data Analysis

Descriptive statistics of the retrospective and prospective data were used to analyze the data obtained from S3. Descriptive statistics are used to describe, compare, characterize relationship, and summarize data. Descriptive statistics can be shown in three ways including a narrative, in a graph, or in a table (Polit, 2010). After the implementation of the multidisciplinary team, the utilization rates were compared to determine if the rate increased to the goal of 65% within a 9-month period. Data analysis using a two-tailed t-test was used to compare the changes in the mean scores of the utilization rate before and after the involvement of a multidisciplinary team. The information was entered onto a Microsoft Excel spreadsheet. All analysis was conducted using IBM SPSS Statistics 24.

Evaluation Plan

A program planner accomplishes two purposes as he/she prepares an evaluation plan. The first purpose is to assess how successful the program was in meeting the objectives, and the second is to identify areas that need improvement (Kettner, Moroney,

& Martin, 2013). The project was evaluated by having a surgical technician utilize a checklist daily and document missing items, the technician communicated with the logistics department to determine the arrival date of requested items. The report was given to the charge nurse and the progress was discussed in a weekly multidisciplinary perioperative meeting. A monthly analysis will be done with the information gathered to determine if the required surgical instruments were available, and if the potential exist to increase the OR utilization rate from 42% - 65%.

Summary

The purpose of the DNP project was to decrease the occurrences of delays for the orthopedic surgical patients by having surgical instruments arrive on time to facilitate the first cases to begin at 0730, which in turn would improve efficiency in OR utilization. The project initiative used a before after quantitative design to determine if the required surgical instruments were available to facilitate surgical procedures starting 0730. Lewin's model of change was used to guide the project. The population of the project consisted of the entire OR staff, orthopedic surgeons, logisticians, sterile processing, and anesthesia providers. There were no sampling due to the involvement of the entire OR staff. Work on the project did not begin until approval was received from Walden University Institutional Review Board. Descriptive statistics of the retrospective and prospective data was used to analyze the data obtained from S3. The collected data comprise the total hours available for use, the hours used, and utilization rate for the OR.

After the implementation of the multidisciplinary team, the utilization rates was compared to determine if the rate increased to the goal of 65% within a 9-month period. The information was entered onto a Microsoft Excel spreadsheet. The project was evaluated by having weekly meetings with the perioperative multidisciplinary team. A monthly analysis was done with the information gathered to determine if the required surgical instruments were available, and if the potential exist to increase the OR utilization rate from 42–65%.

This paper continues to explore the practice problem by presenting the findings and recommendations in Section 4.

Section 4: Findings and Recommendations

Introduction

Surgical delays due to unavailable instruments cost an average of $1,000 per hour (Akridge, 2004). Delays in the OR have a significant financial impact on organizations and hinder optimal patient flow (Peter et al., 2011). Delays may not directly affect the patient health, but they can increase anxiety for patients and their families. Surgical delays are also a source of frustration for the surgeon and the perioperative staff (Wong, Khu, Kaderali, & Bernstein, 2010).

The ACC at the project site was experiencing delays of orthopedic surgeries due to unavailable instruments which led to a decrease in OR utilization efficiency. The gap in practice was the orthopedic surgeries were not starting on time at 0730. The purpose of this DNP project was to decrease the number of OR delays for orthopedic surgical patients. The practice-focused question was as follows, would a multidisciplinary approach to the procurement of instruments and supplies for the orthopedic surgical patient ensure an on-time surgery start at 0730 resulting in increased efficiency in the utilization of the OR from 42–65%within a 9-month period?

The sources of evidence that collected were the total hours available for surgery, the hours used, and the utilization rate for the OR. The evidence was obtained by DNP student's preceptor from the electronic Surgical Scheduling System (S3). The analytical strategies used were descriptive statistics using a two-tailed *t* test to compare the changes in the mean scores of the utilization rate of the OR before and after the involvement of a

multidisciplinary team. The information was entered onto a Microsoft Excel spreadsheet. All analysis was conducted using the IBM SPSS Statistics 24.

Section 4 is a presentation of the findings, implications, recommendations, strength and limitations of the project.

Findings and Implications

In August 2015, during the DNP student's practicum, a multidisciplinary team was organized. The team held weekly meetings to collaborate with each other on the procurement of the needed supplies and instruments. The charge nurse of the OR reviewed the surgery schedule, listing the surgeries that needed the procurement of supplies and instruments. The logistics representative confirmed that the supplies were ordered. The sterile processing department representative confirmed the arrival date of the instruments for the sterilization process to take place. After approval was received from Walden University Institutional Review Board, in November 2017, data collection was started. Retrospective data were collected before the involvement of the multidisciplinary team in August 2015, as well as prospective data after the multidisciplinary team involvement.

Preinvolvement of a Multidisciplinary Team

Retrospective de-identified data was collected on OR utilization from January 1, 2015 to June 30, 2015 before the involvement of the multidisciplinary team. Combining the 6 months of OR utilization data showed that of the 2,936 total hours available, only 1,415.8 hours were used with an average OR utilization of 48.22% (Table 1).

Table 1

OR Utilization Pre-Involvement of the Multidisciplinary Team

Month	Total hours available	Used hours	Utilization rate (%)
January 2015	440	242.6	55
February 2015	464	233.8	50
March 2015	520	249.2	48
April 2015	520	212.5	41
May 2015	464	216.3	47
June 2015	528	261.4	50
Total	2,936	1,415.8	48.22

Figure 2 illustrates the percentage of OR utilization per month from January 2015 to June 2015. OR utilization ranged from 41% to 55% before the involvement of the multidisciplinary team (Figure 2).

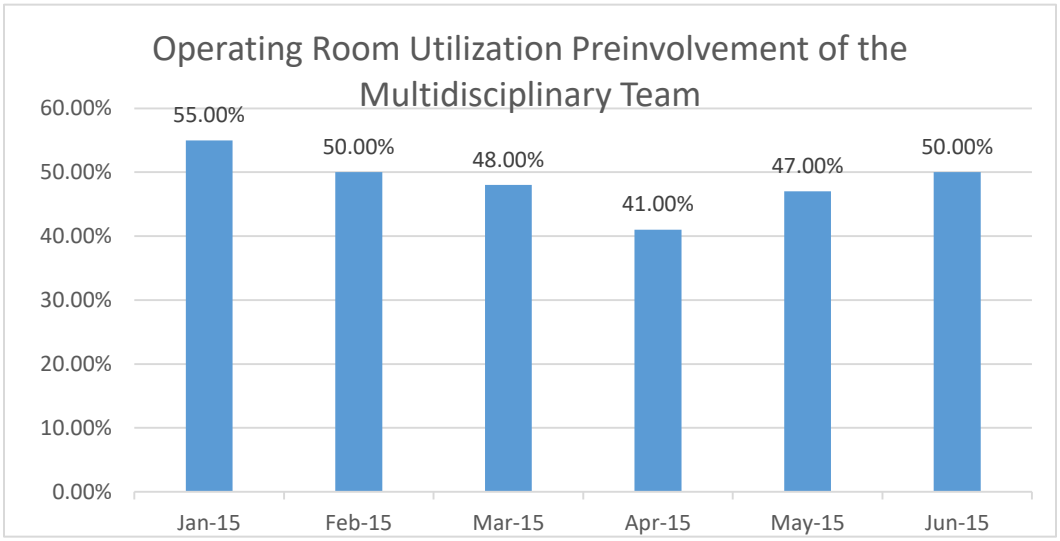

Figure 2. Percent of OR utilization preinvolvement of the multidisciplinary team.

Postinvolvement of a Multidisciplinary Team

Prospective deidentified data were collected on OR utilization from October 1, 2015 to June 30, 2016 after the involvement of the multidisciplinary team. Of the 4,424 hours that were available during this 9-month period, 2,032.7 hours were used with an average OR utilization at 46.4% and 1.82% decrease from the retrospective data (Table 2).

Table 2

OR Utilization-Post Involvement of a Multidisciplinary Team

Month	Total hours	Used hours	Utilization rate (%)
October 2015	512	271.4	53
November 2015	432	207.5	48
December 2015	456	215.3	47
January 2016	464	198.4	43
February 2016	480	284.7	59
March 2016	552	229.4	42
April 2016	504	220.5	44
May 2016	504	203.2	40
June 2016	520	202.3	39
Total	4,424	2,032.7	46.4

Figure 3 illustrates the percentage of OR utilization per month from October 2015 to June 2016. OR utilization ranged from 39% to 59% after the involvement of the multidisciplinary team (Figure 3).

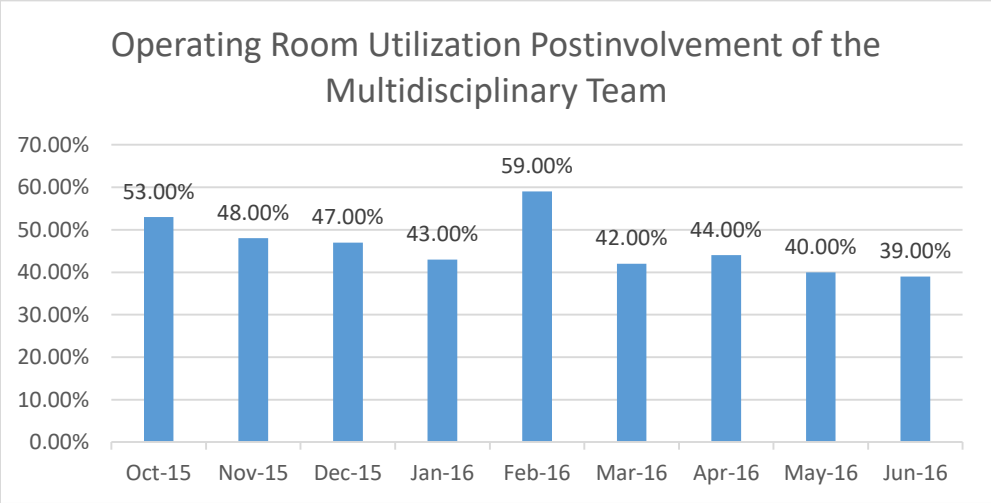

Figure 3. Percent of OR utilization postinvolvement of the multidisciplinary team.

Data analysis using a two-tailed *t* test was used to compare the changes in the mean scores of the utilization rate before and after the involvement of a multidisciplinary team. Table 3 shows descriptive statistics for OR utilization rate before and after the intervention (Table 3). The analysis was conducted using the Statistical Package for the Social Sciences (SPSS) 24. An independent samples *t* test found no significant effect of the intervention, $t(13) = 0.74$, $p > .05$. Because the *t* test was not significant at the $\alpha = .05$ level, this study found no evidence that the multidisciplinary team affected the utilization rate.

Table 3

Mean Scores of OR Utilization Rate Before and After the Multidisciplinary Team Involvement

Time period	M	SD	Minimum	Maximum
Before intervention	48.41%	4.70	40.87	55.14
After intervention	46.10%	6.61	38.90	59.31

Unanticipated Limitations Impact on Findings

Shortly after the involvement of the multidisciplinary team the CL left the organization due to personal reasons before the expired purchasing contracts were renewed. The expired contracts were a continuous source of deficiency because of the delays in obtaining the required instruments in a timely manner. The CL had ensured the DNP student during the practicum that the expired contracts would be renewed. However, later in the practicum the DNP student experienced difficulty in meeting with or obtaining information from the CL concerning the renewal of the contracts. A month later, after the CL left the organization, the CPD was replaced and subsequently left the organization. The OR has been under scrutiny from the U.S. Army Medical Command and is being compared to other military facilities' productivity and financial viability.

Implications Resulting from the Findings

Individuals

The project practice-focused question may have been accomplished if the Logistics department was able to renew the expired purchasing contracts as it is that department's responsibility to maintain the contracts. The efficient use of OR time

depends on equipment, scheduling of cases, allocation of staff, and performance of surgery. Efficient use of supplies, equipment, personnel, and facilities can allow the organization to schedule an additional surgery each day which can result in $1.8 million additional revenue annually (Lange-Kuitse & Meadows, 2002). Vassell (2016) reported that the American Association of Critical Care Nurses recognizes that the work environment affects nursing performance and patient outcome. Therefore, creating a healthy environment in the OR can lead to greater efficiency (Vassell, 2016).

Communities

Increasing the utilization rate of the OR may have been accomplished if the CL, and the CPD had gotten the chance to work collaboratively for a longer period of time as part of the multidisciplinary team to implement the change in practice. According to Bowers (2012), implementing research findings into practice can take many years due to poor adoption because of insufficient knowledge and skills, lack of adoption by leaders, and lack of desire to change (Bowers, 2012). The management of patient outcomes and applying evidence to practice are tools that can be used to improve quality of care and patient outcomes (White & Dudley-Brown, 2012).

Institutions

The OR at the project site was slated for closure in September 2018, and is now closed. The military team members are being sent to other assignments and are not being replaced. The OR is being staffed with civilian personnel, and there is no momentum among the remaining staff to ensure the purchasing contracts are renewed and the

instruments are available as they wait in anticipation for the closure and finding other positions throughout the organization. The surgical patients are being referred to other military facilities. Improving OR efficiency involves high OR costs, each minute that an OR is not used has a negative impact on overall hospital costs and the OR budget. To maximize the utilization of the OR requires that every case starts on time each morning. Improving OR utilization is essential for maintaining the organization financial viability (Panni et al., 2013).

Systems

OR utilization is often used as an index to evaluate a surgeon's performance and it is an indicator of the organization performance (Kettner, Maroney, & Martin, 2013). Utilization rates depend on booked surgical cases that start and ends on time (Wright, Roche, & Khoury, 2010). Wright et al., (2010) evaluated an initiative to improve cases starting on time in the OR. Kotter's eight steps to transforming organization was used for the process of change using a multidisciplinary team approach. The findings showed that the OR utilization increased from 6–60% over a 9-month period using a multidisciplinary approach. Wright and colleague (2010) concluded that a multidisciplinary approach can increase the number of surgeries that start on time.

Potential Implications for Positive Social Change

Decreasing surgical delays can have the potential implication for positive social change, since delays hinders optimal patient flow, increases anxiety for both the patient and their families. Surgical delay is a source of frustration for the surgeon and the

perioperative staff, and have a significant economic impact on hospitals. Another potential implication for positive social change was for the CL and the CPD to maintain open communication through initiatives that will play a central role in establishing interprofessional collaboration, which includes the implementation of sustainable practice changes of logistics and the OR to minimize surgical delays. Decreasing surgical delays can have a positive implication for social change (Wong, Khu, Kaderali & Bernstein, 2010). Delays and cancellations causes psychological trauma to patients as they undergo the pre-operative mental and clinical preparation again. The emotional and economic implications for the patient and the families can be significant (Talati, et al., 2015).

The management of patient outcomes and applying evidence to practice are tools that can be used to improve quality of care and patient outcomes (White & Dudley-Brown, 2012). The American Association of Colleges of Nursing (AACN), DNP Essential VI focuses on interprofessional collaboration for improving patient and population health outcome. The aim of the DNP project was to increase OR utilization and to help the two chiefs maintain open communication through initiatives that will play a central role in establishing interprofessional collaboration, which includes the implementation of sustainable practice changes of the logistics and the OR (AACN, 2006).

Recommendations

The data will be presented to the Chief Nurse with the recommendation to have the expired purchasing contracts renewed, keep the multidisciplinary team members actively

engaged and encourage them to work collaboratively and have weekly meetings, which can potentially address the gap in practice of the delays of the orthopedic surgeries, and follow the new procedure guidelines for the procurement of instruments (Appendix C). A technician should utilize a checklist and review the surgical schedule a week in advance to document missing surgical items (Appendix A). The technician should communicate with the logistics department to determine if there are any issues that would delay the arrival of the requested items. The technician should report any delay issues to the charge nurse, who will then discuss the issues delaying the arrival of supplies in the weekly multidisciplinary team meeting (Appendix B). A monthly analysis should be done to determine the progress of achieving the goal of having surgical instruments available for an on-time start 90% of the time, as well as determining if the potential exist to increase the OR utilization from 42% - 65%.

Strengths and Limitations of the Project

Strengths

There were three **s**trengths that were identified for the project. The first strength was the support of the ACC leadership. The Chief Nursing Officer (CNO) was very engaged since the OR was being reviewed by the Military Medical Command and there was discussion about closure. The CNO was supportive and gave the latitude for the development of the project. The second strength was the use of the Social cognitive theory from the behavioral theories of change which was useful to facilitate change in communication between the leaders of the logistics and perioperative departments. The

social cognitive theory proposes that behavior change is affected by personal factors, individuals must believe in their capability to change and possess the self-efficacy to change (White & Dudley-Brown, 2012). The third strength was the use of Lewin's three-step model of change; unfreeze, move, and refreeze which were useful in planning for change in practice at the ACC. In Lewin's change model the people involved must participate in all aspect of the change. The unfreeze step was useful in getting all stakeholders to understand the need for the change by communicating the rationale for the proposed change in a weekly multidisciplinary meeting. The move step facilitates the multidisciplinary team creation of a detailed plan of action to implement the new steps in the procurement process, so that supplies would be available for the orthopedic surgeries. The refreeze step was used to stabilize the change in practice, a new policy was written with the collaboration of the multidisciplinary team, meetings were held to facilitate and maintain the new change in practice (White, 2014).

Limitations

A limitation identified was the lack of historical data on cancelled or delayed orthopedic surgeries to establish a benchmark. The organization used paper charting and the delays were annotated in the patient's charts, thus, there was no way to identify which patient was delayed. Data collection is critical in achieving national quality goals. Congress, recognizing that electronic data collection is critical in achieving national quality goals, coordinated the national health information technology strategy, outlined in Health Information Technology for Economic and Clinical Health (HITECH). HITECH

is understood as an essential foundation for the broader efforts to restructure health care delivery. HITECH will facilitate new means of improving the quality, efficiency, and patient-centeredness of care. Data is used to reform payment structures and procedures, manage clinical quality, improve efficiency, and drive improvements in public health (Buntin, Jain, & Blumenthal, 2010). Another limitation at the ACC is that it is a military facility and the stakeholders are transient, as they move to a new assignment every 2–3 years. The OR is now slated for closure, the potential exists that the project may not be followed by the remaining staff members.

Wright et al. (2010) evaluated an initiative to improve cases starting on time in the OR. Kotter's eight steps to transforming organization was used for the process of change using a multidisciplinary team approach. The findings showed that the OR utilization increased from 6% - 60% over a 9-month period using a multidisciplinary approach. Wright and colleagues (2010) concluded that a multidisciplinary approach can increase the number of surgeries that start on time. A multidisciplinary approach is recommended for future projects to increase the number of surgeries that start on time.

Summary

Section 4 reviewed the findings and implications, provided recommendations, and discussed the strengths and limitations of the project. Retrospective data was collected on OR utilization from January 1, 2015 to June 30, 2015 before the involvement of the multidisciplinary team. Combining the 6 months of OR utilization data showed that of the 2,936 total hours available, only 1,415.8 hours were used or 48.22% OR utilization.

Prospective data was collected on OR utilization from October 1, 2015 to June 30, 2016 after the involvement of the multidisciplinary team. Of the 4,424 hours that were available during this 9-month period after the involvement of the multidisciplinary team 2,032.7 hours were used at a 46.4% utilization rate, with a 1.82% decrease from the retrospective data.

Data analysis using a two-tailed *t* test was used to compare the changes in the mean scores of the utilization rate before and after the involvement of a multidisciplinary team. The analysis was conducted using the Statistical Package for the Social Sciences (SPSS) 24. An independent samples *t* test found no significant effect of the intervention, $t(13) = 0.74$, $p > .05$. Because the *t* test was not significant at $\alpha = .05$ level, this study found no evidence that the multidisciplinary team affected the utilization rate.

Shortly after the involvement of the multidisciplinary team the CL left the organization due to personal reasons before the expired purchasing contracts were renewed. A month later, the CPD was replaced and subsequently left the organization. The OR has been under scrutiny from the U.S. Army Medical Command and is being compared to other military facilities' productivity and their financial viability. Decreasing surgical delays have implications for positive social change, such as optimal patient flow, decrease anxiety for both the patient and their families, decrease frustration for the surgeon and the perioperative staff, and can have a positive economic impact on hospitals.

Section 5: Dissemination Plan

An important component of translation of evidence is dissemination. If the results are not disseminated, no change will occur (White & Dudley-Brown, 2012). The purpose of dissemination of the project results is for reporting the outcome to stakeholders and to other professionals in similar settings. The information and the results of this DNP project are expected to have application beyond the project practice area. Most likely the problem that is identified at the project site is being experienced by others (Zaccagnini & White, 2012). According to Zaccagnini and White (2012), it is important to share the project findings, whether the project produced the results that were expected or different results. The results of the DNP project will be disseminated electronically in an executive summary to the CNO, summarizing the problem statement, background, the results, and recommendations (Appendix D). The project will also be disseminated to other OR professionals at the Association of periOperative Registered Nurses (AORN) Global Surgical Conference.

Analysis of Self

As Practitioner

The DNP program allowed me to develop a wide array of knowledge obtained from the sciences and now I have the ability to translate that knowledge effectively to benefit patients in the demands of the practice environment. I can develop and evaluate new practice approaches based on nursing theories (American Association of Colleges of Nursing, 2006). I was instrumental in a policy development at the project site for the

timely procurement of instruments and supplies for the orthopedic surgical patients. I used the social cognitive theory and Lewin's three-step change model while engaging the stakeholders. Change theories explain how and why a project's activities are expected to lead to a desired policy change. A change theory provides a road map in achieving a change to a policy based on assessment of the policy environment in which you are working. Policy changes can be just one component of a larger social change strategy; a change theory can define how specific policy change relate to larger social change goals (Institute of Medicine, 2010).

As Scholar

As a scholar, I was able to apply my knowledge to solve a problem in the OR through the scholarship of practice in nursing, which involves translating research into practice, disseminating and integrating new knowledge. (American Association of Colleges of Nursing, 2006). As my knowledge increased during the DNP program, I realized that I was suited to serve as an effective collaborative team leader and participant, not only because of my scientific knowledge, skills, and abilities related to practice discipline, but because of my comprehension of organizational and systems improvements, outcome evaluation processes, healthcare policy, and leadership (Zaccagnini & White, 2012). The DNP program guided me to acquire competence in knowledge application such as translating research into practice, evaluating practice, improving the reliability of health care practice and outcomes, and participating in collaborative research (American Association of Colleges of Nursing, 2006). I feel

confident in my ability to be an effective leader and establish interprofessional teams. Through my mentoring I was able to bring two leaders together to achieve a common goal. Interprofessional collaboration is important for the success of a program. Interprofessional collaboration describes the interaction among individual professionals who may represent a particular discipline, but bring their unique educational backgrounds, experiences, values, and identities to the process (Zaccagnini & White, 2012).

Project Manager

The DNP program has allowed me to be proficient in quality improvement strategies and in creating and sustaining changes at the organizational level. As a project developer I was able to assess an organization, identify system issues, and facilitated organization wide practice delivery change. I facilitated collaborative team functioning where some team members were able to overcome impediments to interprofessional practice through the formation of a multidisciplinary team. According to White (2014), factors that influence the successful implementation of change are support from leaders, trust among team members, staff having a voice in the change process, key stakeholders, transparency and buy in through recurring meetings.

I went into the practicum proficient in my ability to use information systems and technology to implement quality improvement initiatives. A challenge that I faced was the facility not using an electronic health record for charting. Paper charting is used, and the delays of the orthopedic surgeries were annotated in the patient's paper charts, thus,

there was no way to identify which patient was delayed establishing a benchmark. Another challenge that I faced was the communication conflict between the logistics supervisor and the perioperative supervisor. I used the social cognitive theory from the behavioral theories of change to facilitate a change in communication between the two leaders. Lewin's change management model provided a helpful framework to facilitate getting all stakeholders to participate in all aspect of the change. Towards the end of my practicum I was unable to meet with the CL as I tried to get information from her concerning the renewal of the expired purchasing contracts.

An insight that I have gained during this journey is perseverance. I had voiced to Dr. Verklan that I wanted to withdraw from the DNP program. Dr. Verklan encouraged me not to withdraw, and told me that pursuing a terminal degree is not easy, because if it was everyone would possess a terminal degree. Another insight that I gained was through the Essentials of Doctoral Education for Advance Nursing Practice. I am prepared to address current and future practice issues. I am prepared to use nursing theories and theories from other disciplines to evaluate and develop new practice approaches (AACN, 2006).

Summary

Section 5 presented the dissemination plan, and the analysis of self. As a practitioner, scholar, and project manager, I have acquired the skills necessary to develop and evaluate new practice approaches based on nursing theories. I realized that I am suited to serve as an effective collaborative team leader and participant not only because

of my scientific knowledge, skills, and abilities related to practice discipline, but because of my comprehension of organizational and systems improvements, outcome evaluation processes, healthcare policy, and leadership. The DNP project guided me to acquire competence in knowledge application such as; translating research in practice, evaluating practice, improving the reliability of health care practice and outcomes, and to participate in collaborative research. I feel confident in my ability to be an effective leader and establish interprofessional teams. Insights that I have gained through this journey is perseverance and the Essentials of Doctoral Education for Advance Nursing Practice.

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Appendix A: Presurgical Checklist

Surgery Date	**Procedure:**			**Surgeon:**	**Patient**
Availability	**Yes**	No	**N/A**	**Comments**	
Correct Preference Card					
Instruments					
Equipment					
Supplies					
Implants					
Logistic Department					

Resolution:_____
_____
_____
_____
_____

Completed by: _____

Date: _____

Appendix B: Multidisciplinary Team Meeting

Surgery Scheduled Time/Date	Surgeon	Preop (Issues identified, review)	OR (Rep needed, special equipment, staffing needs/concerns)	Anesthesia (Block needed, concerns from chart review)	Sterile Processing (Special trays, instrument)

Appendix C: Procedure for Procurement of Instrumentation

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY MEDICAL DEPARTMENT ACTIVITY
2480 LLEWELLYN AVENUE STE 5800
FORT GEORGE G. MEADE, MARYLAND 20755-5129

OR/SPD SOP 24 August 2015

Procedure for Procurement of Instrumentation

1. **Purpose:** To provide well-defined guidelines for the procurement and handling of instrument for orthopedic surgery

2. **Scope:** Operating Room**,** Logistic, Sterile Processing

3. Procedure:

A. The designated operating room staff will contact the logistic department and place the order for the instrument as soon as the surgery is scheduled, with a delivery date of two (2) days prior to the surgery date.

B. The logistic department will make arrangement for the instrument to be delivered two (2) days in advance of the surgery date.

C. The instrument will be delivered to the Sterile Processing Department (SPD) for sterilization.

D. The SPD will decontaminate, inspect, assemble, package, and perform routine biological testing if implants are involved with adequate time for final results of the biological test.

LATONIA F. CASON
CPT, AN
OIC, OR/SPD

Appendix D: Executive Summary

Problem Statement: The practice issue was the delay of orthopedic surgeries due to unavailable instruments which had led to a decrease in efficiency in OR utilization.

Question: Would a multidisciplinary approach to the procurement of instruments and supplies for the orthopedic surgical patient ensure an on-time surgery start at 0730 resulting in increased efficiency in the utilization of the OR from 42–65%within a 9-month period?

Results

Preinvolvement of a Multidisciplinary Team

Retrospective data was collected on OR utilization from January 1, 2015 to June 30, 2015 (Table 1). Combining the OR utilization data showed that of the 2,936 total hours available, only 1,415.8 hours were used or 48.22% OR utilization.

Table 1

Operating Room Utilization Preinvolvement of the Multidisciplinary Team.

Month	Total hours	Used hours	Utilization rate (%)
January 2015	440	242.6	55
February 2015	464	233.8	50
March 2015	520	249.2	48
April 2015	520	212.5	41
May 2015	464	216.3	47
June 2015	528	261.4	50
Total	2,936	1,415.8	48.22

Figure 2 illustrates the percentage of OR utilization per month from January 2015 to June 2015. OR utilization ranged from 41% to 55% before the involvement of the multidisciplinary team (Figure 2).

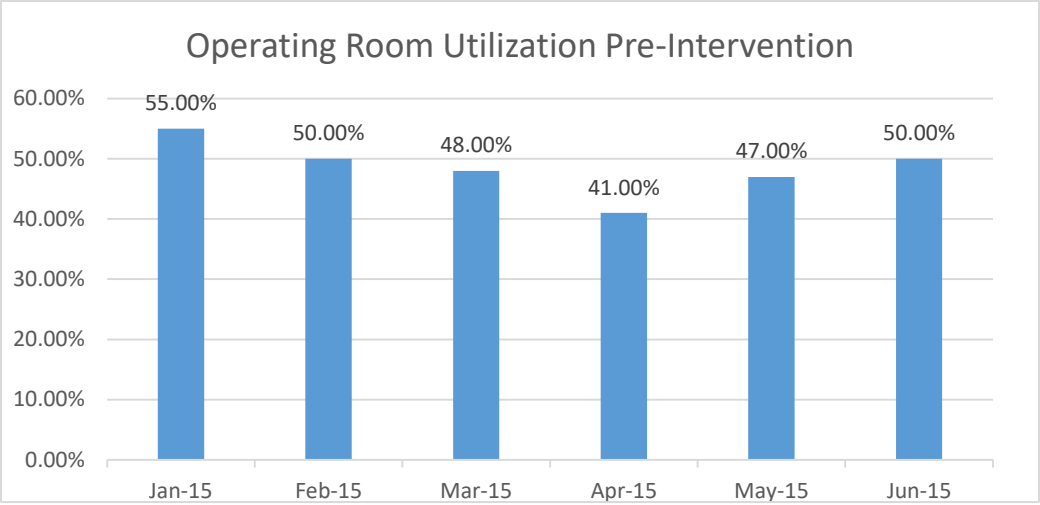

Figure 2

Post Involvement of a Multidisciplinary Team

Prospective data was collected on OR utilization from October 1, 2015 to June 30, 2016 (Table 2). Of the 4,424 hours that were available during this 9-month period, 2,032.7 hours were used at a 46.4% utilization rate, with a 1.82% decrease from the retrospective data.

Table 2

Operating Room Utilization-Post Intervention

Month	Total hours	Used hours	Utilization rate (%)
October 2015	512	271.4	53
November 2015	432	207.5	48
December 2015	456	215.3	47

January 2016	464	198.4	43
February 2016	480	284.7	59
March 2016	552	229.4	42
April 2016	504	220.5	44
May 2016	504	203.2	40
June 2016	520	202.3	39
Total	4,424	2,032.7	46.4

Figure 3 illustrates the percentage of OR utilization per month from October 2015 to June 2016. OR utilization ranged from 39% to 59% after the involvement of the multidisciplinary team (Figure 3).

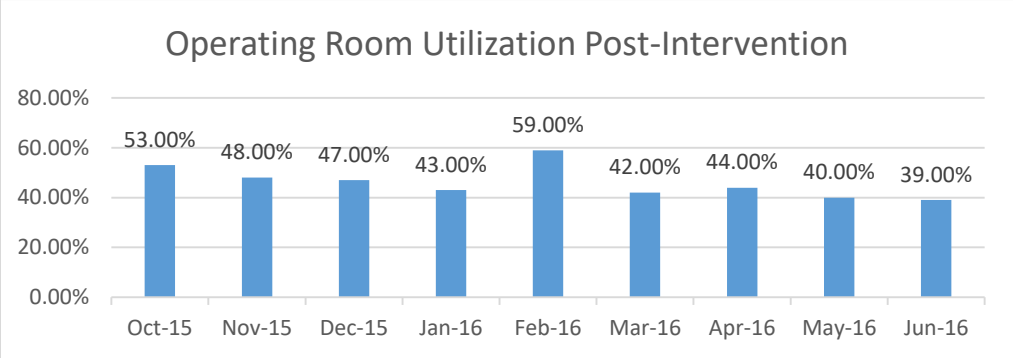

Figure 3

Data analysis using a two-tailed t-test was used to compare the changes in the mean scores of the utilization rate before and after the involvement of a multidisciplinary team (Table 5). The analysis was conducted using the IBM SPSS Statistics 24. An independent samples *t* test found no significant effect of the intervention, t (13) = 0.74, *p* > .05. Because the *t* test was not significant at α = .05 level, this study found no evidence that the multidisciplinary team affected the utilization rate.

Mean Scores of OR Utilization Rate Before and After the Multidisciplinary Team Involvement

Time Period	M	SD	Minimum	Maximum
Before Intervention	48.41%	4.70	40.87	55.14
After Intervention	46.10%	6.61	38.90	59.31

Recommendation

Renew the expired purchasing contracts, continue with the multidisciplinary team working collaboratively and have weekly meetings, which can potentially address the gap in practice of delays of the orthopedic surgeries starting on time. Utilize a checklist and review the surgical schedule a week in advance to document missing surgical items. The technician should communicate with the logistics department to determine if there are any issues that would delay the arrival of the requested items. The technician should report any delay issues to the charge nurse, who will then discuss the issues delaying the arrival of supplies in the weekly multidisciplinary team meeting. A monthly analysis should be done to determine the progress of achieving the goal of having surgical instruments available for an on-time start 90% of the time, as well as determining if the potential exist to increase the OR utilization from 42% - 65%.